TROPICAL DISEASES BUREAU.

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DISEASES DUE TO PROTOZOAN PARASITES.

DUKE (H. L.). **An Inquiry into an Outbreak of Human Trypanosomiasis in a "*Glossina morsitans*" Belt to the East of Mwanza, Tanganyika Territory.**—*Proc. Roy. Soc.* 1923. Jan. 4. Series B. Vol. 94. No. B. 660. pp. 250–265. With 1 map.

In this paper the author gives an account of his investigations into an outbreak of human trypanosomiasis in Tanganyika. The author's views of the results obtained may be summarized as follows :—

The outbreak occurred in an area where *G. palpalis* has not been found, but where a *morsitans*-like fly is present everywhere. It is improbable that the trypanosome was *T. gambiense*, the evidence all pointed to it being transmitted directly from man to man, and it closely resembled the game trypanosomes of the belt. In the author's opinion the trypanosome was *T. brucei*.

About 1919 there was a very severe famine, and at the same time an epidemic of influenza. The famine led to the slaughter for food of wild and domestic animals, and was responsible, in conjunction with the influenza, for a lowering of the vitality of man. At the same time the disappearance of animals caused the *morsitans*-like flies to attack man. It appears to be probable that in this way the human beings became infected with *T. brucei*. It can never be ascertained whether prior to this period there was a trypanosome capable of surviving in man in this belt. The whole of the circumstances indicated that once a native had become infected the infection spread to those who came in contact with him, and in such a manner and with such manifestations as to indicate that the spread of the infection was mechanical.

Dissections of large numbers of flies failed to indicate any increase in the number of flies cyclically infected (in comparison with figures obtained by BRUCE, Miss ROBERTSON and the author in other areas).

MACKENZIE (A. J.). **Case of Trypanosomiasis.**—*Ann. Trop. Med. & Parasit.* 1922. Dec. Vol. 16. No. 4. p. 457.

The infection was contracted in a fly area in Sebungwe, S. Rhodesia. Posterior nuclear forms were found. Galyl, soamin, and tartar emetic were without effect. The case terminated fatally.

Hyperaesthesia, change of mentality, keratitis, and progressive emaciation were the most prominent symptoms.

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NÖLLER (W.). **Die Übertragung des *Trypanosoma theileri* Laveran 1902.** [The Transmission of *T. theileri*.]—*Berlin. Tierärzt. Wochensch.* 1916. Sept. 28. Vol. 32. No. 39. pp. 457–460.

The author gives an account of experiments which yielded evidence that *T. theileri* is transmitted by *Tabanus glaucopis*, and that the transmission is not purely mechanical.

VAN SACEGHEM (R.). **Les infections doubles à trypanosomes pathogènes.** [Double Infections with Pathogenic Trypanosomes.]—*Compt. Rend. Soc. Biol.* 1922. Oct. 28. Vol. 87. No. 31. pp. 994–995.

In this note the author draws attention to the necessity of keeping in mind the possibility of simultaneous infection with two species of trypanosomes when two recognizably distinct forms are encountered in the blood.

VAN SACEGHEM (R.). **L'intrapalpébro-réaction dans le diagnostic des Trypanosomiases.**—*Compt. Rend. Soc. Biol.* 1922. Oct. 28. Vol. 87. No. 31. pp. 992–993.

The author uses a special antigen, which he terms " trypanoléine," for the diagnosis of trypanosomiasis by the intra-palpebral test. The material is prepared as follows: To tubes of Ponselle medium (2 per cent. unwashed agar in tap water in slants) are added 5 to 10 cc. of defibrinated blood containing large numbers of trypanosomes. It is not stated whether the agar is melted before the blood is added. The tubes are left at room temperature for three days. The blood, which has been transformed by the hypotonic medium into a deep red liquid, is collected and mixed with an equal amount of a mixture containing glycerin and physiological serum in equal parts. A few drops of carbolic acid are added as a preservative.

In some cases cultures of *T. theileri* are obtained in the medium. These should be rejected.

A dose of 1 cc. of trypanoléine injected intra-palpebrally produces a characteristic reaction in infected persons and animals. It reaches its maximum at the third hour and may persist for several hours.

The reaction is not a specific one, but is of a general nature, and is characterized by lachrymation and a tense painful oedema of the eyelid, but it is never so intense as that obtained with mallein in glandered horses.

The author appears to imply that the test is infallible, but gives no account of any investigations designed to prove that non-reactors were not infected.

VAN SACEGHEM. **Sérothérapie des Trypanosomiases animales.** [The Serum-Therapy of Animal Trypanosomiases.]—*Bull. Agric. Congo Belge.* 1922. June. Vol. 13. No. 2. pp. 358–362.

The author has observed on a number of occasions that in some cases of chronic trypanosomiasis of animals the blood is sterile—as proved by inoculation—at the time of death. He believes that antibodies elaborated by the animal are responsible for this clearing of the circulation. It appears, however, that some of the trypanosomes escape this destruction by converting themselves into " special " neurotropic forms, which are incapable of living in the circulation, but " vegetate " in the cerebro-spinal liquid, where they are protected against the antibodies in the blood.

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The question he has set himself to answer is whether the serum of an infected animal, which exerts only a feeble action on the trypanosome responsible for the production of the antibodies, might not be used for the treatment of trypanosomiasis in another animal.

Five goats were inoculated with 5 cc. of blood from a beast infected with *T. ruandae.* Six to ten days later trypanosomes appeared in their blood. Three of the goats received weekly subcutaneous injections of 100 cc. of serum from cattle affected with chronic trypanosomiasis for five weeks. The injections did not cause the immediate disappearance of trypanosomes from the circulation. The goats remained in good condition and apparently perfectly healthy. Although it is specified that the injections were repeated weekly for five weeks, it is stated that treatment lasting two months sufficed to clear the circulation of trypanosomes completely. Three months later the goats were considered as completely cured.

The two control goats died of trypanosomiasis. It is held to be probable that serum treatment of infections contracted naturally through flies will be more effective than the treatment of animals infected experimentally, as in the latter case the trypanosomes have to some extent acquired a degree of resistance to the antibodies which their presence in the animal has provoked.

VAN SACEGHEM (R.). **La Sérothérapie dans le traitement des Trypanosomiases.** [Serum-Therapy in the Treatment of Trypanosomiases.] —*Compt. Rend. Soc. Biol.* 1922. Oct. 28. Vol. 87. No. 31. pp. 995–998.

The author promises a detailed account of the experiments briefly referred to in this paper. It may be gathered that he found that fat-tailed sheep could be infected with *T. congolense,* and that after a course of some months recovery occurred. He further found that massive doses (a litre) of blood containing the trypanosome could be injected subcutaneously with a view to reinforcing the immunity. He believes that the antibody produced is not anti-trypanosomic, but anti-trypanotoxic. The elaboration of endotoxins by trypanosomes is held to be established because the author finds that a small non-toxic dose of emetic, if given to an animal harbouring trypanosomes, is sufficient to cause death of the animal, the death being due to liberated endotoxins.

The curative effect of emetic is said to be explained as follows: The emetic causes destruction of trypanosomes, and thus reduces the production of toxin, but the production of antitoxin continues, and by adjusting the intervals between doses a kind of reserve of antitoxin is built up which in time is sufficient to effect a cure.

RODENWALDT (E.) & DOUWES (J. B.). **Over de toepassing van Bayer 205 bij de Surra van het Paard in Nederlandsch-Indië.** [Employment of "Bayer 205" for the Treatment of Surra in Horses in the Dutch East Indies.]—*Nederlandsch-Indische Bladen v. Diergeneesk. en Dierenteelt.* (Veeartsenijkundige Mededeeling No. 38.) 1922. Vol. 33. Nos. 5 & 6. pp. 1–79. With 2 Plates (3 figs.) and 27 tables in text. (Buitenzorg, Java.)

The authors of this important paper—one of them from the Institute of Tropical Medicine at Hamburg, the other a Dutch veterinarian—have recently been engaged in treating horses, suffering from surra,

with " Bayer 205." Their investigations, carried out in the Veterinary Laboratory at Buitenzorg, are here summarized and discussed at length ; and it may be said at once that they possess considerable interest for all engaged in the study of the chemotherapy of trypanosomiasis. Writing under a motto (in German) to the effect that " You ought to be frightfully careful," and beginning with the remark that " the history of the experimental therapy of the trypanosomiases is a concatenation of disappointments," the present authors record their own observations with an unusual degree of caution ; while they openly deplore the fact that earlier accounts of similar experiments carried out in the neighbouring island of Sumatra [presumably the work of BAERMANN is referred to—see *Trop. Vet. Bull.*, Vol. 11, No. 1, p. 2] have raised false hopes regarding the efficacy of " Bayer 205 " as a cure for surra.

It is remarked, at the outset, that the efficacy of " 205 " in surra can be better studied in horses than in buffaloes, for the disease runs a much more chronic course in the latter animals, which often show—without specific treatment—long intermissions, with apparent recovery, between relapses. During the intermissions trypanosomes are so scanty in the blood that they may be undiscoverable, and consequently the effects of drug-treatment are very difficult to determine exactly. The horse, in which the disease is acute and usually brief, is a much more suitable animal for experiment ; and the authors do not disguise their scepticism regarding the alleged " cures " which have been reported in buffaloes, and in other animals showing similarly chronic infections. (They express the opinion, indeed, that the action of " 205 " upon surra in the buffalo can only be ascertained properly by experiments on a large scale—not by studying its apparent effects on individual animals ; and they state that mass experiments directed to this end are now in progress in Java. The probable outcome of this work, however, is not indicated.)

A brief account of the clinical manifestations of surra in the horse —as seen in Java—is given. The authors note, as characteristic symptoms, that the animal becomes slow and heavy, shows weakness or even paralysis in the hindquarters, and often develops an oedematous condition of the limbs, breast, or belly. The temperature rises to 39° or 40° C., and the pulse becomes very rapid—the heart-beat being much augmented. The nasal secretion is increased, and may be purulent. Eye symptoms are also common—mucus in the corners, the conjunctivae swollen and reddened and sometimes jaundiced, with occasionally iritis and keratitis. Albumen is constantly present in the urine. In later stages the animal becomes increasingly lethargic, and stands with half-closed eyes and dropped head. It becomes rapidly emaciated, and finally falls down and dies. The appetite usually remains good till near the end. The disease lasts for 3–4 weeks if the spinal cord is infected : in other cases the horse may survive for 7–8 weeks. [It is important to bear these symptoms in mind when studying the tables showing the effects of treatment.]

Earlier experiments upon laboratory animals had indicated that " 205 " was possessed of high trypanocidal efficacy, but very low toxicity for the vertebrate host—some observers even putting the ratio of curative to toxic dose as high as 1 to 167. Very successful results had also been previously recorded in the treatment of dourine in horses, and the present authors therefore had good grounds for expecting that " 205 " would prove efficacious for the cure of surra in the same animals. It is clear, however, that they have shared in the disappointments of their forerunners.

In the first place they found, unexpectedly, that "this medicament is very toxic for the horse"; so much so, in fact, that they are "still unable to estimate"—at the end of their observations—the relation between toxic and curative dose, beyond making the general affirmation that these doses "lie very near together." This is a significant conclusion, which appears to be fully borne out by their observations; and it leads them to conclude, further, that "the employment of very large doses, which would definitively destroy the parasites, is therefore excluded." Moreover, they find that smaller doses of the drug given repeatedly "are likewise unemployable," for they produce a cumulative intoxication while, at the same time, they fail to get rid of the parasites and to prevent relapses.

The toxic effects of "205" upon the horse are described at some length, and are repeatedly referred to in the accounts of individual cases. Typically they are as follows: First, a severe urticaria, often over the whole body. Later, a coating of the mucous membrane of the tongue and lips, gradually resolving itself into localized erosions. The animal dribbles or foams at the mouth, its breath is fetid, and it loses its appetite and becomes emaciated. The rectal mucous membrane is often severely affected—proctitis, periproctitis, and even abscess-formation, having been observed in this region. Dermatitis, with tenderness of the skin and perhaps loss of hair, appears to be a usual symptom. It is commonly localized in the legs, and especially just above the hoof, where it takes the form of a severe pododermatitis involving the coronet. The hoofs become hot, and painful on pressure or percussion. There is a rapid loss of condition, and the horse soon becomes unable to stand. It then lies down and dies, or, if it happens to survive, recovers very slowly. After recovery curious rings are seen on the hoofs, having the appearance of ridges or thickenings running parallel with the coronet. (These are shown photographically in figs. I and II.) A distinct ring appears after every dose of "205" administered, and "even with the smaller doses ring-formation is not altogether absent, so that one can read off directly on the hoof, by the number of more or less well-marked rings on it, the number of injections given and the length of the intervals between them." These symptoms are produced by "205" not merely in horses suffering from surra, but also in normal healthy animals. (Experiments were made to determine this point, as the Bayer firm—to whom these results were communicated in a confidential report—apparently refused to believe at first that the drug could produce such serious effects on healthy horses.)

Post-mortem findings are recorded from only one animal—Horse 478, a healthy Javanese pony of 130 kgm., which received 5 gm. of "205" intravenously, and succumbed in nine days. At death the coronets of all four feet were greatly swollen. The lips were acutely inflamed and the mouth and pharynx covered with a whitish yellow coat, while the tongue and oesophagus showed definite erosions. The heart-muscle presented "a cooked appearance." The stomach and intestines were much inflamed, and there was severe proctitis. The bladder was very hyperaemic; the "liver degenerated, kidneys ditto." [Unfortunately nothing else is said anywhere regarding the effects of "205" on the kidneys.] It was found that both native ponies (from Java and the Sunda Isles) and large Australian horses were susceptible to "205"—the latter, apparently, being intolerant of even quite small doses. As a rule the drug appears to have been administered subcutaneously or intravenously: but it is noted (p. 62) that one horse (No. 431) received two successive doses of 3 gm. each *per os*, the result being

unsuccessful; and it is remarked incidentally (p. 64) that administration by the intrathecal route was out of the question, owing to the severity of the disease in its acute stages.

Details of treatment of 21 horses are shown in a series of instructive tables—too elaborate for reproduction here—which are further elucidated in the text. From the information recorded it is apparent that almost every animal—including even those which received small doses of the drug—showed definite symptoms of more or less severe intoxication; while in the whole series only three appear to have been cured (Nos. 418, 448, 414), though one other (No. 415) was still alive and also possibly cured at the time of writing. No matter how the drug was administered—whether in one large dose or in successive smaller doses—the results appear to have been equally disappointing. Sometimes the animals died after two or three weeks; at other times they recovered temporarily, then relapsed, were retreated, again relapsed—and so on, sometimes several times in succession—but ultimately died, or were killed *in extremis*. The following cases selected at random will serve as illustrations of the results generally :—

No. 402. Weight, 122 kgm. Received 5 gm. "205" at one dose. Relapsed after 26 days : died 15 days later.

No. 352. Horse of 373 kgm. Received 7·95 gm. at one dose. Died after 17 days.

No. 442. Pony, 176 kgm. Received altogether 15 gm., given in doses of 0·5 gm. every other day. Relapsed, and was killed *in extremis* some five weeks later.

No. 435. Horse, 385 kgm. Received (approximately) 1 gm. every four days till 11 gm. had been administered. Relapsed, and received a single dose of 3·7 gm. Relapsed again, and received a further dose of 3·7 gm. Subsequently killed *in extremis* about four weeks later.

No. 423. Pony, 126 kgm. Received 0·25 gm. every other day. Treatment stopped (owing to intoxication) after 7 gm. in all had been given, but begun again after lapse of 14 days and continued till 15 gm. in all had been administered. Relapsed four weeks later, and was killed.

No. 439. Weight, 170 kgm. Received 1·7 gm. (*i.e.*, a dose of 1 gm. per 100 kgm. body weight—as recommended for treatment of dourine). Relapsed after 14 days. A similar dose (1·8 gm.) again given, again followed by a relapse. Retreated with same dose and same result four times successively. Finally killed *in extremis*.

In all the foregoing cases more or less severe toxic symptoms were manifested. Most of the horses treated were naturally infected, and in early stages of the disease; but two (Nos. 405 and 232) were experimentally infected animals, and these likewise showed signs of intoxication—though they received altogether but 4 gm. each, in broken doses—and finally died. (The authors state that it was to be expected, from previous results, that artificially infected animals would be more easily curable, though the event did not bear this out.)

Below are a few details concerning the three horses that were probably cured :—

No. 418. Weight, 216 kgm. Received 5 gm. at one dose. At the time of treatment this animal displayed no symptoms of surra, though trypanosomes were present in its blood. Apparently cured : in good condition 10 months later. No trypanosomes discoverable in blood—microscopically or by subinoculation.

No. 448. Weight, 175 kgm. Received 5 gm. at one dose. Symptoms of surra present; moderately severe case. Apparently cured, and in excellent condition, some five months later.

No. 414. Weight, 166 kgm. Just recently sick. Received 0·5 gm. every other day, until 10 gm. in all had been given. Apparently cured: free from parasites and had increased in weight 11 months later. This animal, unlike the others, showed no toxic symptoms.

It was found that the administration of "205" did not cause the trypanosomes to disappear from the peripheral blood immediately. To ascertain whether the persistent trypanosomes were still infective, samples of blood were taken every five minutes after injection of the drug, and inoculated into guinea-pigs. As a result, it was found—in three recorded experiments—that the trypanosomes, though still present, had lost their infectivity for guinea-pigs in 15, 20, and 25 minutes after the horses had received injections of 5, 3, and 2 grammes of "205" respectively. Considering the minute amount of the drug which the guinea-pigs could thus have received along with the trypanosomes, the authors observe that "this argues strongly in favour of a direct action [of '205'] upon the trypanosome cell." Morphological study of the trypanosomes during the period of their persistence revealed no evidence that the drug acts by inhibiting division of the parasites—as some previous authors have maintained.

At the end of their paper the authors describe experiments designed to test whether *T. evansi* can acquire a resistance to "205" as a result of the administration of a sub-curative dose to an infected horse. These experiments appear to answer the question in the affirmative; for it was found that guinea-pigs and white rats, infected from untreated horses, were curable with doses of "205" which were unable to cure infections in similar animals experimentally infected with the blood of treated horses. Moreover, since the blood of a treated horse remains infective for so very short a time after treatment (as noted in the preceding paragraph), the authors feel justified in concluding that resistance to "205" must be acquired by the trypanosomes almost instantaneously, and that resistant races must arise by a process of natural selection.

An attempt was made to immunize a horse (No. 404) by the simultaneous injection of trypanosomes and "205," the animal subsequently receiving repeated inoculations with trypanosomes alone, in order to test its resistance. "The result was that the horse finally died of surra; and from this we believe it can be inferred that it will not be possible to immunize an animal in this manner. But the fact that 3 grammes of '205' apparently sufficed to protect a horse of 85 kgm. during 2½ months against the consequences of seven subsequent inoculations [with trypanosomes], and that only the eighth inoculation after 11 weeks was successful, speaks strongly, in our opinion, in favour of the drug having a prophylactic action of long duration and practical utility."

Experiments were also made to determine "how long after infection has actually occurred the drug can forestall its effects." The results—exhibited in three tables—were inconclusive; but the authors feel justified in concluding from them "that it is possible, by the injection of non-toxic doses of '205' during the first days of the incubation period, to inhibit the outbreak of the disease."

Reviewing all their results, the authors finally conclude that a horse may be cured of surra by a single large dose of "205"—about 5 gm. per 200 kgm. body-weight—or by a series of smaller doses. In the

latter case they recommend a dose of 0·5 gm. per 150 or 200 kgm., given every other day until a total of 10 gm. (or, if possible, 15 gm.) has been administered. The recorded results, however, give little ground for optimism regarding the outcome of such treatments; and the authors themselves point out that with such dosage "disappointments due to the toxicity of the drug cannot be avoided," though the intermittent method is the less dangerous. They add that "these two methods have a chance of succeeding in those cases only in which the disease is still in an incipient stage, and when clinical symptoms are absent or have only just made their appearance. The sooner treatment is begun, the greater is the chance of cure." "In animals which already show typical clinical symptoms, or which have already been ill for a long time, treatment is useless." "With the appearance of a relapse, all further treatment is destined to fail."

Upon the results of their investigations the authors also base a number of administrative recommendations, of which the following are the most important: All animals suffering severely from surra should be slaughtered, since they are incurable with "205." All animals in early stages of the disease should be treated by one or other of the methods mentioned in the foregoing paragraph. All animals which relapse after such treatment should be killed, "since further treatment is useless and there is a fear that resistant strains [of *T. evansi*] may be produced." All animals in the vicinity—including buffaloes—which are suspected of being infected, should receive a prophylactic injection of "205" (1 gm. for every 150 kgm. body-weight), to be repeated after four weeks. Whenever possible, all animals should be confined in fly-free stalls, to prevent the spread of infection and the possible dissemination of drug-resistant strains of the trypanosome.*

PATAKI (P.). **Zur Behandlung der Beschälseuche.** [The Treatment of Dourine.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1923. Feb. 10. Vol. 49. No. 4/5. pp. 108–191.

The author gives details of treatment of a number of naturally contracted cases of dourine.

The administration of Bayer "205" in doses of 0·01 gm. per kg. body-weight causes the disappearance of trypanosomes from the mucus of the vagina and urethra; plaques and other localized evidences of infection disappear, but localized or diffuse swelling, or even necrosis of the skin, may result from the injection of the drug. In many cases there may be evidence of inflammation of the coronets.

In an experiment with atoxyl and tartar emetic a naturally infected mare, which showed plaques and other lesions, including incoördination, a dose of 3 grammes of atoxyl in 5 per cent. solution intravenously was first given. The visible lesions disappeared and no trypanosomes could be found in the vaginal mucus. A week later 2 grammes of tartar emetic in 2 per cent. solution were given intravenously. After a further week 4 grammes of atoxyl were administered, and this was followed by a second injection of emetic a week later.

All symptoms disappeared, and two months later the complement fixation test yielded a negative result.

A mare which had shown clinical evidences of infection, and had previously been unsuccessfully treated with antimony trioxide, was given two months later three intravenous injections of 4 grammes of

* Summarized by Mr. Clifford DOBELL, F.R.S.

atoxyl each in 5 per cent. solution. Two months later the blood test, which had previously been positive, gave a negative result, and the animal was put to light work. Death occurred shortly afterwards from broncho-pneumonia.

Antimony trioxide, which is not soluble in water, was injected as a suspension into the jugular vein of two animals infected with dourine, but without effecting any improvement in them.

IWANOW (E.) **A Contribution to the Biology of** *Trypanosoma equiperdum.—Parasitology.* 1922. Dec. Vol. 14. Nos. 3 & 4. pp. 315–319.

It has been firmly established that dourine is transmitted almost exclusively through coitus, but it should be noted that infection does not necessarily occur in all cases of coitus with infected animals, but only in two-thirds or three-quarters of the instances.

The object of the author's experiments was to ascertain whether *T. equiperdum* passed into the sperm, and, if so, whether it was capable of penetrating the intact mucous membrane of the female genital tract; for these experiments mice, rabbits and dogs were used.

It was found that in mice the contents of the vesicula seminalis remained free from *T. equiperdum*, even when parasites were abundant in the blood, and similarly that the trypanosomes did not pass into the sperm of the dog. With a view to discovering whether *T. equiperdum* could traverse the intact mucous membrane, infected blood diluted with normal saline was introduced into the vagina by means of a very fine elastic catheter lubricated with vaseline: two series of experiments were undertaken: (1) care being taken to avoid any excoriation of the mucous membrane (eight mice and four rabbits), and (2) with the mucous membrane of the vagina scratched, so that blood appeared (three mice and one rabbit). It was found that none of the first series of animals became infected, but all of the second series.

These experiments which were performed in 1917, were repeated in 1922, with another strain of *T. equiperdum* obtained from MESNIL: the results were similar.

The author explains the transmission of *T. equiperdum* amongst horses during coitus by the fact that this is often accompanied by slight abrasions of the genital organs. With regard to the control of the disease, he recommends that attention should first of all be directed to the methods of preventing possible wounds and abrasions in the mucous membrane of the genital organs of horses during coitus. He adds:—

"Horses should not be allowed to breed promiscuously in the herd, but should be covered individually under control, which allows of taking care that the external genital organs are clean during coitus, that the penis does not get scratched by the hairs of the mare's tail. The external genitals of the mare should be washed and her tail carefully dressed before the act. Then, to facilitate coitus it is advisable to lubricate the external genitals of the mare and the penis of the stallion with vaseline or oil."

VLADESCO (R.) & IRIMINOIU (Gh.). **Sur l'action thérapeutique du trépol dans quelques trypanosomiases.**—*C.R. Soc. Biol.* 1923. Feb. 3. Vol. 88. No. 4. pp. 287–288.

Guinea-pigs infected with *T. equiperdum*, nagana, or surra, were treated with trépol [bismuth compound], the dose given being 1–1·5 cc. Intraperitoneal injection was followed almost immediately by the disappearance of parasites from the blood, but the animals died

invariably from peritonitis. Intramuscular and subcutaneous injection caused disappearance of parasites, but relapses occurred in from 16–23 days. In all guinea-pigs injected with trépol, hepatitis and nephritis were found post-mortem.

LEFROU (G.) & OUZILLEAU (F.). **Essais du tryparsamide dans le traitement de la maladie du sommeil.** [Tryparsamide in the Treatment of Sleeping Sickness.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 802–805.

Intravenous injection is less effective than subcutaneous administration. In one case a subcutaneous injection of 2 grammes [*i.e.*, 0·04 g. per kilog] produced sterilization which lasted a year. On the other hand, the sterilization following half that dose lasted in one instance only 84 hours.

Unfortunately 2 grammes appears to be about the maximum safe dose which can be administered subcutaneously, and even this produces a severe local reaction.

The drug does not appear to be superior to atoxyl.

BLANCHARD (M.) & LEFROU (G.). **Le traitement de la maladie du sommeil par le " 189."** [The Treatment of Sleeping Sickness by means of " 189."]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 797–802.

A single injection of a moderate dose of the drug causes only a brief clearance of the peripheral circulation.

A single large dose administered in the same way produces a more marked effect, but the local reaction is so severe as to preclude the administration of such doses.

A series of doses produces sterilization of some duration, but the cases have not been under observation sufficiently long to permit of any opinion as to the permanence of the cure.

Administration of the drug *per os* is useless, and it is without effect during the second phase of the disease. It sometimes produces lesions of the optic nerve.

SERGENT (Edm.) & DEGUILLAUME (A.). **Tableau généalogique d'un trypanosome du dromadaire conservé 4 ans par passages sur cobayes. Augmentation de sa virulence.**—*Bull. Soc. Path. Exot.* 1922. Dec. 13. Vol. 15. No. 10. pp. 947–951. With 1 fig.

The authors have followed the modification in the virulence of *T. berberum*, isolated from a dromedary, during its passage through guinea-pigs. The conclusions are :—

1. The virulence of *T. berberum* for guinea-pigs becomes increased as a result of repeated passage through these animals.

2. The increase in virulence appeared suddenly at the nineteenth passage, two and a half years after the inoculation of the first guinea-pig.

3. It has not varied appreciably from the 19th to the 55th passage during one and a half years.

4. The mean duration of the infection was, in the first 19 passages, 73 days, with 154 days of amplitude of variation. In the remaining 36 passages, the average was 18 days with 46 days of amplitude of variation. Consequently, the trypanosome acquired an exaltation of virulence at the 19th passage and has maintained this during the following 36 passages.

FRANCHINI (G.). **Action du latex d'Euphorbes sur différents trypanosomes. Culture de flagellés dans des latex divers.** [The Action of the Latex of Euphorbiaceae on Different Trypanosomes. Cultivation of Flagellates in Various Forms of Latex.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 41–50.

The author has recently reported the occurrence of trypanosomes in the latex of various Euphorbiaceae, which he considers are in all probability trypanosomes of insects. Interest therefore attaches to the possible effects of such latex upon trypanosomes derived from man and animals.

Details are given of experiments in which *T. evansi*, *T. soudanense*, *T. brucei*, *T. lewisi*, and *T. gambiense* were used for this purpose. In each case controls with normal salt solution, and citrate solution were used.

Latex from eight species of Euphorbia was used. The mixtures were made on slides and covered with large cover slips. The slides were then placed in a moist chamber at 26° C.

The trypanosomes were found to retain their vitality longer in the latex than in the control solutions. *T. lewisi* survived the longest, then *gambiense* and *brucei*, with *evansi* and *soudanense* last. It is probable that the multiplication of bacteria after the first 24 hours affected the vitality of the trypanosomes adversely. Further experiments were made regarding the cultivation of flagellates in mixtures of broth and latex and in latex sterilized in the autoclave.

The flagellates used were *Herpetomonas pyrrhocoridis*, *H. chamaeleonis*, *H. ctenocephali*, *H. tarentolae*, cultures of Oriental sore and canine leishmania. The trypanosomes were *T. gambiense* and *T. lewisi*.

H. pyrrhocoridis multiplied in nearly all the kinds of latex used. The samples of latex used in these experiments were obtained from a larger variety of plants than in those described above.

H. chamaeleonis in general grows well.

H. ctenocephali did not multiply in any of the samples used.

In some cases *H. tarentolae* grew well.

The cultures of Oriental sore grew well in the latex of *Elaeophorbia drupifera*.

T. lewisi grows in different samples of latex and the change into the crithidial forms takes place more quickly than in N.N.N. medium and blood broth. But vitality is not maintained for long in any one tube.

T. gambiense maintains its morphology and mobility for a short time only. After several days leishmaniform parasites are found.

Some of the flagellates show very pronounced changes in morphology. The flagellates of Oriental sore in the latex of *Elaeophorbia drupifera* became very large and rounded. They show several nuclei, and several centrosomes with or without flagella. *H. pyrrhocoridis* in latex of *E. calyculata* and to some extent in *Alstonia scholaris* show an oval dilatation at the anterior end, and the body is sometimes coiled in a helical manner.

The experiments are held to show that certain flagellates are capable of living and multiplying in the latex of plants.

SERGENT (Edm.), PARROT (L.) & HILBERT (D.-N.). **Morphologie de piroplasmes observés en Algerie chez le mouton** (*Gonderia ovis*). [The Morphology of Parasites found in the Blood of Sheep in Algeria (*Gonderia ovis*).]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 789–792. With 1 text fig.

The proportion of corpuscles invaded by parasites appears to vary in different parts of the circulation. In the peripheral blood the authors

found eight per thousand corpuscles invaded, in the heart blood the proportion was three per thousand, and in the blood from the liver 220 per thousand.

" Koch's bodies " have not been found in any of the internal organs. The figure shows the various forms of the parasite encountered. The smallest parasites resemble anaplasma, other forms recall those found in *Gonderia mutans* of cattle, including the cruciform type. The type most frequently encountered was ring-shaped.

SERGENT (Edm.). **De l'association des différentes piroplasmoses entre elles, à propos du prétendu *Piroplasma annulatum* Dschunkowsky et Luhs 1904.** [The Relationships of the Various Piroplasmoses among themselves.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 23–30.

The author summarizes the types of piroplasmoses at present recognized as follows :—

(1) Due to *Piroplasma bigeminum* and *Babesia bovis.*
(2) Due to *Gonderia mutans.*
(3) Due to *Theileria parva.*
(4) Due to *Anaplasma marginale.*

And adds another without specifying the causal organism, but refers to a disease which he described with VALLERY-RADOT and LHÉRITIER as " bilious haemoglobinuric jaundice."

The study of these diseases is complicated by the frequent occurrence of more than one type of infection in an animal at the same time. The author is of opinion that the species *Theileria* (*Piroplasma*) *annulata* should be removed. It has been thought that the parasite described by DSCHUNKOWSKY and LUHS should be classed as of the mutans type, because, in spite of its morphological resemblance to *T. parva*, it was found to be transmissible by blood inoculation (TARTARKOWSKY).

The recent discoveries by CARPANO and DONATIEN, PLANTUREUX, ROSSI, and ESPERANDIEU, that diseases due to parasites morphologically resembling *Theileria parva* in all respects are sometimes transmissible by blood inoculation owing to the presence in the blood of parasites with the characters of " Koch's bodies," render valueless the non-inoculability by means of blood of *Theileria parva* as a feature distinguishing it from *Gonderia mutans.*

Sergent proposes that the terms " Tropical piroplasmoses " and " Mediterranean Coast Fever " used by DSCHUNKOWSKY and LUHS and CARPANO should be dropped, and that the diseases should be named according to the parasites found. Thus, the disease studied by CARPANO, which from his description appears to have been a mixed infection, should be called " a triple infection due to parva, mutans, and anaplasma."

In describing cases of piroplasmosis it must always be borne in mind that there is possibly and very probably a mixed infection.

DONATIEN (A.), PLANTUREUX (E.), ROSSI (P.) & ESPÉRANDIEU (G.). **La Theiléríose bovine en Algérie.** [Bovine Theileriasis in Algeria.] —*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 6–10.

Up to the present the existence of African Coast Fever has not been definitely established in Northern Africa, although SERGENT and LHÉRITIER recorded the occurrence of bodies resembling Koch's bodies in the spleen and glands of animals affected with jaundice.

In the course of an enquiry into cases of jaundice in bovines in Algeria, which was carried out during the summer of 1922, the authors encountered a parasite possessing all the morphological characters of *Theileria parva*, and also succeeded in transmitting the disease experimentally. The disease occurred in a number of more or less marshy districts between the middle of June and the middle of September. Animals between the age of 18 months and two years were attacked, and both crossbreds and country-breds were infected. The disease in the latter was less severe.

The disease was always acute. The symptoms were in general those of a febrile disease. There was swelling of the eyelids and discharge from the eyes. The conjunctiva was pale or stained yellow, and in some cases showed petechiae.

Diarrhoea was frequently observed, and in some cases was complicated by dysentery.

In cases which ran a prolonged course the blood became pale and watery. The superficial lymphatic glands were enlarged and painful. Haemoglobinuria was a frequent symptom.

The duration of the disease ranged from 7–10 days, and when recovery occurred it took place rapidly, but attacks frequently proved fatal.

The lesions were, a variable amount of yellowish or pink serous fluid in the abdomen, enlargement of the spleen—sometimes enormous,—gelatinous oedema around the enlarged glands, which were sometimes ecchymosed; punctiform haemorrhages in the bone marrow; ulceration and ecchymoses of the mucous membrane of the fourth stomach; evidence of acute haemorrhagic enteritis of the small intestine. The liver was enlarged and icteric, and the gall bladder distended with thick brownish bile.

The kidneys showed marked congestion. As already stated, the blood and lymphatic glands contained parasites indistinguishable from those of East Coast Fever. The authors confirm an observation made by CARPANO in Eritrea that plasma bodies may be found both free or within large mononuclear leucocytes in the peripheral circulation. This was usually in severe and fatal cases.

A calf from an unaffected region was inoculated with 100 cc. of blood from an affected heifer. Koch's bodies were discoverable in the blood used. Infection resulted. This calf formed the starting point of a further series of inoculations, and four passages have been carried out.

From these experiments it was observed that when Koch's bodies occur in the circulating blood prognosis is bad, and further, that in cases in which these bodies are very scantily present in the superficial glands, they may be present in large numbers in other organs.

The authors conclude that in spite of the occurrence of jaundice and haemoglobinuria, in some cases the disease is, in view of the results of microscopic examination, etc., in reality a form of Theileriasis.

LEGER (M.) & BÉDIER (E.). **Piroplasmose à *Gonderia mutans* chez les Bovidés du Sénégal.** [Piroplasmosis due to *Gonderia mutans* in Bovines in Senegal.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 60–62.

The author records the discovery of a parasite of the Gonderia type in a two-year-old bullock. A search for Koch's bodies in the glands and organs failed to reveal any.

The animal was heavily infested with *Amblyomma variegatum* and *Hyalomma aegyptium*.

SCHEIN (H.). **Piroplasmoses d'Indochine.** [Piroplasmoses in Indo-China.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 30–41. With 2 text figs.

The author criticizes investigations made by LAGRANGE [see this *Bulletin*, 1922, Vol. 10, p. 66] regarding the identity of piroplasms occurring in buffaloes and cattle, and quotes experiments which are held to establish the specific nature of the parasite of the buffalo.

VELU (M.). **Thérapeutique générale des Piroplasmoses.** [The Therapeutics of the Piroplasmoses.]—*Rev. Vét.* 1923. Jan. Vol. 75. No. 1. pp. 5–22.

This article is a brief review of the literature of the subject.

STEPHENS (J. W. W.). **A New Malaria Parasite of Man.**—*Ann. Trop. Med. & Parasit.* 1922. Dec. Vol. 16. No. 4. pp. 383–388. With 1 coloured plate.

This paper contains a description of the morphological characters of a malarial parasite detected in a patient in 1918. The characters presented appear to be different from those of any of the recognized species, and the author proposes the name *Plasmodium ovale*. It appears to resemble that described by Ahmed EMIN in 1914 as *Plasmodium vivax*, var. *minuta*, but the author has been unable to obtain his specimens for comparison.

SENEVET (G.) & WITAS (P.). **Evolution spontanée de l'infection à *Haemoproteus columbae*, chez un pigeon isolé à partir du premier mois de son existence.** [The Spontaneous Evolution of Infection with *Haemoproteus columbae* in a Pigeon kept completely Isolated from the Age of One Month.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 787–789.

It has already been recorded by the SERGENTS and BÉGUET that gametes may disappear from and reappear in the circulation of infected pigeons, and these observations are confirmed by Senevet and Witas.

For a period of more than two years the authors have kept under close observation a pigeon which had acquired the infection before it came into their possession. Within a few days of the detection of the parasites they increased enormously in numbers and became larger. Shortly afterwards they decreased, and at the end of three months they were not discoverable in the blood. After a few days small parasites again appeared, and again an increase in number and size was noted. The numbers again decreased, and about six weeks later they had entirely disappeared from the circulation. During the next five months 90 examinations were made without any parasites being detected. Then young gametes appeared again.

In view of the long period during which parasites were not discoverable in the blood great caution must be exercised in deciding whether a bird is infected or not.

CARPANO (M.). **Sulla preparazione degli strisci di sangue da servire specialmente per la ricerca dei Piroplasmi.** [The Preparation of Blood Smears, particularly for the Detection of Piroplasms.]—*La Clin. Vet.* 1922. Nov. 15 & 30, Vol. 45. No. 15. pp. 639–645.

FRANCHINI (G.). **Sur un parasite leishmaniforme du sang du merle et sur quelques trypanosomes d'hirondelles.** [A Leishmaniform Parasite in the Blood of the Blackbird, and some Trypanosomes of the Swallow.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 11–14. With 1 text fig.

LIGNIÈRES (J.). **Sobre el problema de la Tristeza.** [The Problem of Tristeza.]—*Revista Zootécnica.* 1922. Oct. 15. Vol. 9. No. 109. pp. 288–296.

MARSH (H.). **Coccidiosis in Cattle in Montana.**—*Jl. Amer. Vet. Med. Assoc.* 1923. Feb. Vol. 62. No. 5. pp. 648–652.

DE MELLO (F.) & SUCTANCAR (C.). **Morphologie et cycle évolutif d'un Herpetomonas de l'intestin d'***Hemidactylus brookei* **Gray.** [The Morphology and Developmental Cycle of a Herpetomonas of the Intestine of *Hemidactylus brookei* (Gray).]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 795–797. With 1 text fig.

ROUBAUD (E.) & FRANCHINI (G.). **Culture des parasites leishmaniformes obtenus chez la souris par inoculation des fèces de la Puce** *Ctenopsylla musculi.* [Cultivation of Leishmaniform Parasites obtained from the Mouse by Inoculation with the Faeces of *Ctenopsylla musculi.*]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 14–15.

THOMSON (J. G.) & ROBERTSON (A.). **A Case of Human Infection with** *Eimeria oxyspora,* **Dobell. 1919.**—*Jl. Trop. Med. & Hyg.* 1922. Dec. 1. Vol. 25. No. 23. pp. 369–371.

DISEASES DUE TO METAZOAN PARASITES.

CHORLEY (J. K.). **Tsetse Fly, Eastern Border, Rhodesia.**—*Rhodesia Agric. Jl.* 1922. Dec. Vol. 19. No. 6. pp. 680–682.

As the result of a survey the author concluded that at the time the survey was carried out tsetse-flies were not to be found along the eastern border of Rhodesia, and that it was doubtful whether there were any within a distance of 15 miles from the border in Portuguese territory. There appeared to have been a shrinkage in the fly belt since 1919, which was associated with a diminution in the number of cases of nagana among the cattle of the border farms.

The disappearance of fly from known belts is probably influenced by weather conditions which affect the movements of game and parasitism by other insects.

There appears to be a definite relationship between rainfall and the prevalence of nagana. Apart from the movements of game, deciduous forest may be unsuitable for fly during dry periods. In view of the absence of tsetse along the border, it appears to be probable that outbreaks of nagana are due to the mechanical transmission of the virus through the medium of flies other than tsetse. Most of the infected farms are within range of flies carried by animals or man from over the border. It is hardly probable that tsetses carried over the border would remain and infect herds over any length of time without being detected.

Stomoxys, Lyperosia, Tabanus, and Haematopota were found abundantly, and once the virus was introduced conditions would favour its spread.

JOHNSTON (T. H.). **Some Facts of Importance relating to Sheep Maggot Flies.**—*Queensland Agric. Jl.* 1922. Oct. Vol. 18. No. 4. pp. 272–276.

A more detailed account of the observations recorded in this paper is published (in conjunction with TIEGS) in the *Proceedings of the Royal Society of Queensland* (1922, pp. 77–104).

The species particularly studied were *Chrysomyia albiceps*, *C. varipes*, *Lucilia sericata*, Sarcophaga, *Aphyra nigra*, and short notes are given regarding some others. The paper includes an account of the work done in America in connexion with the range of flight of certain blowflies.

C. albiceps is more commonly known as *Pycnosoma rufifacies*. According to PATTON the larvae of this species in India prey upon the larvae of other species. Experiments have been planned with a view to ascertaining whether this observation can be confirmed in Queensland.

The period required for hatching ranges from about 16 to 21 hours according to the season. Larvae feed for about 4 to 5 days, save when infesting living animals, when the period may be shorter. After feeding the larva spends a prepupal period of from 1½–3 days (summer) to 10 days (winter) in finding a place where pupation may be effected. The pupal period ranges from 3–8 days during the warmer parts of the year to 10–20 days during the colder seasons.

Moisture greatly influences the period of pupation, metamorphosis occurring more rapidly under its influence.

Definite information cannot be given as to the interval elapsing between emergence from the pupa to oviposition, but probably 5–6 days are required. The number of batches of eggs laid, and the number of eggs per batch, cannot be stated, nor can exact information be given regarding the duration of life of the fly, but flies bred in captivity in Brisbane lived for 15 to 26 days. Flies generally live a shorter time during warm weather.

Chrysomyia varipes.—This fly frequents carrion. The life-history of this species approximates closely to that of the previous one, but the pupal stage would appear to be more prolonged, a period of 1–3 months being required in winter for this phase.

Lucilia sericata.—This name is accepted provisionally as designating the commonest species of fly found infesting carrion and refuse in Brisbane.

The life-cycle is as follows: Eggs hatch in 16–24 hours; the larva feeds for 4–6 days; 2–20 days are occupied by the prepupal period; the pupal period requires 6–17 days. The extremes for summer and winter are given. Pairing takes place 6–10 days after emergence, and oviposition begins two days later. Specimens bred in captivity lived for 12–36 days in summer and winter.

Lucilia caesar.—It appears to be uncertain whether this fly occurs in Brisbane, although it has been reported to occur in Australia. In view of the fact that experiments carried out in America by BISHOPP showed that blow-flies may travel up to 15 miles from the point of release, the author holds that only concerted action can be of any value for the control of the pests. The main aim should be to deprive the flies of carrion and to attack them in their breeding-places. He thinks that the spraying of sheep with arsenic mixtures is of little value, because it is not sufficiently radical.

WARBURTON (Cecil). **The Warble Flies of Cattle,** *Hypoderma bovis* **and** *H. lineatum.*—*Parasitology.* 1922. Dec. Vol. 14. Nos. 3 & 4. pp. 322-341. With 3 text figs.

Although the Oestrid flies, *Hypoderma bovis* and *lineatum*, whose bionomy is here so well described, are not incident to the tropics, there are several good reasons for noticing parts of this excellent and well-documented paper in some detail.

Both these species produce during the summer months (in England) about 800 eggs, and attach them to the hairs of cattle—usually of the legs, and preferably of yearlings. The eggs give issue to minute spinulose larvae, which pierce the skin in their immediate locality, and after entering their host are, to speak loosely, lost for some time. During the autumn and winter months (in England), however, they are to be found again in the wall of the host's oesophagus, being now of a glassy semi-transparency and smoothness, except for spinules at the mouth and posterior spiracles. " How they reach this position is entirely unknown." From the oesophageal wall the larva works its way, either directly through the soft parts, or sometimes by way of the posterior foramina and the spinal canal, to the skin of the host's back, where it begins to form a cyst, or " warble," becoming now opaque, and spinulose on the ventral surface and losing its mouth-hooks. Having made a breathing hole through the host's skin, it lies in its cyst with its posterior spiracles applied to the opening, increases greatly in size by absorption of the inflammatory products of its presence and assumes its familiar shape. In the spring—mostly during May, in England—the full-grown larvae leave their host, the exit, which requires some effort, being made through the breathing-hole. The freed larva drops to earth and pupates, preferably in some hole. The pupal stage averages about five weeks.

As is well known, Hypoderma larvae sometimes attack man and make long and protracted wanderings under the skin before they become stationary in an inflammatory tumour. Two cases are here cited in some detail. In one—a boy 3 or 4 years old—the first signs of dermatitis were noticed near the sternal end of the right clavicle five months before the extraction of the living larva from the cheek: in the interval the larva had travelled down and up the chest, down one arm to the elbow, then up again and over the shoulder and part of the back, thence to the ear (which became much swollen), thence to the eyelid before passing down the cheek: its track was marked by a line of inflammation with occasional abortive pointings. In the other case an egg was laid on an experimenter's trousers. It hatched in eight days, and in an hour and three-quarters the larva had burrowed through the skin of the leg. In the fourth month afterwards it was located by swellings on the hip and abdomen, and in the same month some pain in swallowing indicated that it was in the gullet. Finally, in the fifth month, it was extracted from the mouth.

VAN SACEGHEM (R.). **L'oestre du mouton au Ruanda (Afrique Orientale).** [*Oestrus ovis* in Ruanda—West Africa.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 17–18.

The author records the occurrence of this parasite, and states that it is responsible for very serious losses.

He has found it in the bronchi in one instance.

Larvae removed from the frontal sinuses and kept in the laboratory yielded flies in 30 days.

CAMERON (H. E.). **Bot Anaphylaxis.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Dec. Vol. 62. No. 3. pp. 332–342.

In this paper are described some experiments which were carried out with a view to ascertaining whether a condition known by the name " jiggers " is really an anaphylactic condition due to the presence of bots in the stomachs of horses affected with it.

No definite results were obtained.

LANE (Clayton). **Some Bursate Nematodes from Indian and African Elephants.**— *Ind. Jl. Med. Research.* 1921. July. Vol. 9. No. 1. pp. 163–172. With 7 plates.

This paper deals with certain bursate nematodes collected from Indian and African elephants. All fall into the super-family *Strongyloidea* of the sub-order *Strongylata.*

The *Strongylidea* comprises two sub-families, the *Strongylinae,* Railliet, 1893 (sens. nov. et strict.), and the *Oesophagostominae* sub-fam. nov.

In elephants the *Strongylinae* are represented by *Equinurbia, Choniangium,* and *Deccrusia* ; the *Oesophagostominae* by *Murshidia, Quilonia, Amira,* and *Pteridopharynx,* Those described in this paper are *Pteridopharynx africana, Quilonia africana, Grammocephalus clathratus, Grammocephalus varedatus,* and *Bathmostomum sangeri.*

ROUBAUD (E.) & DESCAZEAUX (J.). **Deuxième contribution à l'Etude des Mouches, dans leurs rapports avec l'évolution des Habronèmes d'Equidés.**—*Bull. Soc. Path. Exot.* 1922. Dec. 13. Vol. 15. No. 10. pp. 978–1001.

A continuation of the study of the development and mode of transmission of the larva of *Habronema megastoma, H. muscae,* and *H. microstoma.*

The larva of *H. megastoma* develops in the Malpighian tubules of the larva of the house-fly ; that of *H. muscae* in the cells of the fat-body of the larva of the house-fly ; and that of *H. microstoma* in the fat-body of the larva of *Stomoxys calcitrans.* Whether the Habronema larvae are exclusively specific to these respective hosts is uncertain. When the larval worms are fully formed (the development in the first two species occupies a mean minimum of 16 days) they escape from the proboscis of the adult fly, in the same way as the larval *Filaria bancrofti* escapes from the proboscis of its mosquito nurse, on to some part of the equine host that affords the essential requisites of warmth and moisture. Even the larval *H. microstoma* escapes in this way, and is not inoculated by the Stomoxys nurse, since the parasitized labella of the Stomoxys are incapable of penetrating the skin. Experiments show that the larvae can do nothing with the skin of man, and little or nothing with the mucosae of laboratory animals ; the inference therefore is that they do not leave the proboscis of the fly except for an equine. The larvae do not necessarily leave a drowned fly, but if the corpse of an infected fly be warmed in water the larvae emerge not only from the proboscis of the fly but also from the inter-segmental cuticle of the abdomen, so that possibly the same thing may happen when a drowned infected fly is swallowed by a drinking horse. It seems certain that flies infected with Habronema larvae suffer to some extent.

The authors compare Habronema and Filaria from the evolutionary standpoint.

ALLEN (H.). **Treatment of Persistent Debility in Australian Horses due to Habronemiasis and Strongylosis by means of the Single Stomach Tube.**— *Vet. Jl.* 1923. Jan. Vol. 79. No. 1. pp. 24–27.

In the author's experience 60 per cent. of cases of debility are due to Habronemiasis, 20 per cent. to Strongylosis, and 20 per cent. to what he terms constitutional causes. He disagrees with those who hold that parasitic aneurisms of the anterior mesenteric artery are not the cause of colic.

When parasites are detected in the faeces of a debilitated horse it is starved for 36 hours, and the following mixture is introduced into the stomach by means of the stomach tube :—

Formalin	1–2 ounces
Spts. turpentine..	2–3 „
Aloes barb.	3 drams
Sodium chloride..	6 ounces
Ol. lini	1½ pints

This is placed in a bucket and stirred thoroughly with warm water ; the total amount is brought up to 2 gallons.

Purging begins after 12 hours, and may last all the third day. Bran mashes only are given till the purging ceases.

If improvement does not set in the treatment is repeated after 2–3 weeks.

In cases of Habronemiasis a course of treatment with arsenious acid is also given. Three or four courses of treatment, each lasting 6 days with intervals of 4–7 days, are given. The first dose is 5 grains and it is increased by 5 grains daily.

No untoward results have been obtained.

In cases of Strongylosis intravenous injections of atoxyl are given. Four injections of 10, 20, 30, and 40 grains of the drug in a pint of normal saline are given with an interval of 1 day between each. The course is repeated after an interval of 10–14 days.

Removal of dung from the neighbourhood of the horses is imperative. It should be removed to a distance and buried in pits.

HALL (M. C.) & SHILLINGER (J. E.). **Some Attempts to Control Strongyles in Aneurisms by means of Intravenous Injections of Drugs.**— *Jl. Amer. Vet. Med. Assoc.* 1922. Dec. Vol. 62. No. 3.

Details are given of experiments in which extensive treatments with tartar emetic were given to horses affected with verminous aneurisms, and in one case a dose of carbon tetrachloride was given intravenously. The animals stood the injections of the emetic well, but 5 cc. of the latter drug produced alarming symptoms. It is not certain that the drugs affected the worms, as only one was found dead *in situ* ; all the rest were alive.

DE BLIECK (L.) & BAUDET (E. A. R. F.). **Tetrachloorkoolstof als Middel tegen Gastrophiluslarven, Ascaris, Strongyliden en Oxyuris bij het Paard.** [Carbon Tetrachloride as a Remedy for Gastrophilus larvae, Ascaris, Strongylidae, and Oxyuris in Horses.]— *Tijdschr. v. Diergeneesk.* 1923. Jan. 1. Vol. 50. No. 1. pp. 1–10.

This paper summarizes and discusses the results obtained by the authors in treating a series of horses with carbon tetrachloride (CCl_4) at the Veterinary Institute, Utrecht. The particular object of their investigation was to ascertain whether this medicament could be safely and advantageously employed in place of oil of chenopodium as a means of ridding horses of *Gastrophilus* larvae and intestinal worms—more especially Strongylidae.

After briefly reviewing previously published work dealing with carbon tetrachloride as a therapeutic agent—its toxicity, action, administration, etc.—the authors describe their own experiences. Most of their experiments were made on young animals, about a year and a half old, and the results of treatment of 14 of these animals are set out in a table. Before treatment the faeces of each horse were examined microscopically for worm eggs : the animals were then

treated with various doses of the drug: and afterwards their faeces were again examined—for worms and their eggs, and for *Gastrophilus* larvae—during the following four or five days. Finally, ten days after treatment, the animals were killed, and a post-mortem search was made for parasites in the stomach and intestines, and for worm eggs in the rectal faeces.

The authors emphasize the necessity of examining the faeces "for some time" after the administration of the drug; for they have observed that when eggs disappear from the faeces immediately after treatment, they may reappear a little later (*Ascaris*, Strongylidae). In explanation of this phenomenon it is suggested that some worms are only temporarily disabled, and not killed, by the drug, and subsequently resume their egg-laying activities. In other cases (*Ascaris*) the eggs appeared to become more numerous after treatment; and this was attributed to the disintegration of some of the parasites which had been killed by the drug—their eggs being thus liberated in the faeces. In confirmation of this supposition, it was found that such eggs were unripe, and incapable of development.

With adequate dosage of the drug the results appear to have been strikingly successful—especially in the case of Strongylidae and *Gastrophilus*. *Ascaris* infections, and *Oxyuris*, were also very considerably reduced, or completely cured. The following cases, extracted at random from the table, will illustrate the findings:—

No.	Examination of faeces before treatment.	Dose of CCl_4	Parasites removed.	Result of post-mortem examination.	Examination of faeces in rectum.
1	Eggs of *Strongylus* and *Ascaris* fairly numerous.	200 g.	Fairly numerous Stongylids, 11 *Ascaris*, many larval *Gastrophilus*.	No Strongylids, no Ascarids, no larvae of *Gastrophilus*.	No worm eggs.
5	Many eggs of *Strongylus*.	100 g.	Many Strongylids, very many specimens of *Oxyuris*, and fairly numerous larvae of *Gastrophilus*.	No Strongylids, no *Oxyuris*, 15 young larvae of *Gastrophilus*.	No worm eggs.
10	Fairly numerous eggs of *Strongylus*.	50 g.	Strongylids fairly numerous, many specimens of *Oxyuris*, and many larvae of *Gastrophilus*.	1 *Strongylus*, no *Oxyuris*, 5 young larvae of *Gastrophilus*.	No worm eggs.
14	Fairly numerous eggs of *Strongylus*, many eggs of *Ascaris*, eggs of *Strongyloides westeri*.	20 g.	Strongylids, 75 *Ascaris*, many larvae of *Gastrophilus*.	About 200 Strongylids, 30 *Ascaris*, 50 larvae of *Gastrophilus*.	Eggs of *Strongylus* and *Strongyloides*.

Carbon tetrachloride appeared to have little action upon *Strongyloides westeri*; but it was found to be "a powerful remedy against *Gastrophilus* larvae, *Ascaris*, Strongylidae, and *Oxyuris*." The authors recommend a dosage of 100–150 grammes for adult horses, and for foals 20–50 grammes (given either pure or as an emulsion—preferably the former). This amount is well tolerated, does not cause diarrhoea or other noteworthy symptoms, and does not put the animal off its feed. To obtain the best effect, the horse should be kept without food for 24 hours before treatment (in a bare stall—to prevent the animal eating its litter). Food may be given two hours after treatment, when the animal usually displays a good appetite.

The drug itself should be *purissimum**—free from sulphuric acid and phosgene. In this state no untoward results followed the administration of doses as large as 300 or even 400 grammes; but horses so treated passed loose faeces on the following day, and also showed loss of appetite for a couple of days afterwards. The post-mortem examinations (in the series already noted) revealed no gastric or intestinal lesions referable to the action of the drug, which appears to have no harmful effects upon the mucous membrane.

Owing to the large quantity of the drug which must be given at a dose, it is impracticable to administer it in the form of a bolus or in capsules, while there are various objections to the use of the bottle. It is also important that the drug should not be inhaled; and it is impossible to give it with the food or water. Accordingly, the authors believe that the only satisfactory way to administer carbon tetrachloride to horses is by means of an oesophageal tube with a funnel—the animal's mouth being kept open by a BAYER gag, or, still better, with the "mouth-dilator" used in England. They find this method simple and effective in practice, and briefly indicate the precautions to be taken, and details of procedure, in giving the drug by this route.

After treatment it is unnecessary to give a purgative, as in the case of oil of chenopodium. Another advantage which carbon tetrachloride has over this drug is its cheapness—its price being only about one twenty-third of that of oil of chenopodium (in Holland). It can also be obtained pure, and has a constant chemical composition; and as it was found to be highly efficacious, and quite safe when properly administered, it thus appears to be a valuable addition to the armamentarium of the veterinary practitioner.

It may be noted, in conclusion, that the authors of this paper refer to a new method, which is not generally known, for finding worm eggs in faeces. This method consists in emulsifying the faeces in an ERLENMEYER flask with water-glass (one part in two parts water) instead of with a saturated solution of common salt, according to the more usual procedure. Eggs which rise to the surface are removed and examined as in other flotation methods; but the advantage of the water-glass—according to the authors—is that fewer faecal particles rise with the eggs, and, as no salt crystals are formed, the preparation can be easily preserved after examination by merely adding a drop of glycerine to it. The method is one recently devised by SCHUCHMANN and KIEFFER (*Berl. Tierärztl. Wochenschr.*, No. 41, 1922), and was successfully used by the present authors in addition to the brine-flotation method.†

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* The authors note that the specific gravity of the pure drug (at 20° C.) is about 1·6, so that a dose of 100 gm. represents approximately 60 cc.

† Summarized by Mr. Clifford DOBELL, F.R.S.

MARTIN (O.). **Zur Entwicklungsgeschichte der *Filaria papillosa* Rud.** [The Development of *Filaria papillosa* Rud.]—*Berl. Tierärzt. Wochensch.* 1917. Dec. 6. Vol. 33. No. 49. pp. 523–524.

The author describes the finding of *Filaria papillosa* (males and females) coiled up under the peritoneum in horses, and gives measurements of the specimens found.

ADLER (S.) & CLARK (E. J.). **Intra-uterine Infection with *Ancylostoma caninum* in Dogs.**—*Ann. Trop. Med. & Parasit.* 1922. Dec. 30. Vol. 16. No. 4. pp. 353–354.

The authors have examined 13 dogs ranging from 2–15 days old. Worms were found in six of them.

Although infestation with *A. ceylanicum* is common in adult dogs in Sierra Leone no evidence of intrauterine infestation with this parasite has been obtained.

It is pointed out that infestation may take place in two ways : (*a*) *via* the blood-stream ; (*b*) from the maternal peritoneal cavity through the uterine muscle to the placenta. The detection of ankylostome larvae in the peritoneal cavity of experimentally infected guinea-pigs has already been established by YOSHIDA, and the authors have found ankylostome larvae in the peritoneal cavity of a guinea-pig placed for 10 hours in a vessel containing a mixed culture of *A. caninum* and *A. ceylanicum*.

NICOLAS (C.). **Contribution à l'étude de la Stéphanurose du porc.** [Stephanurosis in the Pig.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. p. 819.

The author records the occurrence of *Stephanurus dentatus* in the pig in New Caledonia. While the flesh of infested pigs is fit for food the kidneys and the fat surrounding the urinary system should be rigorously excluded from diet and from lard.

SPARAPANI (J. C.). **Sur l'utilité de la recherche de l'antigène vermineux dans le jetage nasal de porcs atteints de broncho-pneumonie vermineuse au moyen de l'intradermo réaction.** [The Detection of Antigen in the Nasal Discharge of Pigs affected with Verminous Broncho-Pneumonia by means of an Intradermal Test.]—*Rev. Vet.* 1923. Feb. Vol. 75. No. 2. pp. 73–78.

The difficulties attending the clinical examination of pigs prompted the author to attempt to devise a material which could be applied to the diagnosis of verminous pneumonia by means of an intradermal test.

His liquid was obtained by the following technique :—

Nasal discharge is mixed with an equal volume of salt solution to make an even emulsion. The mucin is precipitated by the addition of 3 per cent. acetic acid in the proportion of four or five drops to 10 cc. The liquid is filtered to remove the mucin, neutralized with a 3 per cent. solution of potash and passed through a Berkefeld filter.

Details are given of three tests carried out upon animals affected with non-verminous broncho-pneumonia, and four with verminous broncho-pneumonia.

The exact nature of the reaction is indicated in one case only. The material was injected into the skin on the external surface of the ear. Twenty-four hours later there was an oedematous plaque, with a central deep purple area as large as a penny.

BALOZET. **Epizootie de gastro-entérite parasitaire et faune du tube digestif du mouton au Maroc.** [An Outbreak of Parasitic Gastro-Enteritis and the Fauna of the Alimentary Canal of the Sheep in Morocco.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 820–824.

Parasitic gastritis was responsible for a widespread destruction of sheep during the winter of 1921–22. It is estimated that the losses amounted to 30 per cent. of the total number of animals.

A wet spring followed by a normal summer appeared to play an important part in the causation of the outbreak. The natives never collect food for their sheep, but leave them to forage for themselves. The delay in the fall of the rains in the autumn caused some degree of famine, which laid the animals open to the attacks of the parasites.

The author gives tables showing the percentage of animals (40 were examined) harbouring the various parasites found in the abomasum, small intestine, caecum, and colon, and showing the extent of the infestation in each case.

Eimeria arloingi and *E. faurei* were found, but these did not appear to be responsible for any disease.

Contrary to what might have been expected, *Haemonchus contortus* and *Nematodirus filicollis* were found with relative infrequence. The parasite most constantly and abundantly present was *Trichostrongylus vitrinus*.

Bunostomum trigonocephalum was found in the small intestine in 65 per cent. of cases. The importance of this worm lies in the severe injuries it causes not only to the mucous membrane, but even to the muscular coats of the bowel, as is evidenced by the haemorrhages it produces. The haemorrhages are more numerous than the worms, because they detach themselves from time to time and fix themselves in fresh situations.

Thymol in doses of 3–4 grammes ground to powder and mixed with 250 cc. of water was given by means of a tube, followed after an interval of some hours by sulphate of soda administered in the same way. No parasites were found in the faeces during the following 48 hours.

CAZE's mixture of oils of cade and turpentine in alcohol was inefficacious.

GRIFFITHS (J. A.). **Prenatal Infestation with Parasitic Worms.**—*Vet. Jl.* 1922. Dec. Vol. 78. No. 12. pp. 478–481.

The author refers to previous publications, and states that he has collected fully matured specimens of *Ascaris vitulorum* from calves dead on the tenth to fourteenth day after birth.

ALLEN (J. A.). **The Application of Vajda's Method to the Examination of Fox Faeces.**—*Jl. Amer. Vet. Med. Assoc.* Dec. 1922. Vol. 62. No. 3. pp. 349–352.

Parallel tests were carried out with 32 samples of faeces, using PEPPER's and VAJDA's techniques. The results are tabulated, and the conclusion is drawn that the latter method is at least as accurate as the former.

Modifications of VAJDA's method were introduced in that cones of waxed paper were used for the mixtures of faeces and glycerin, and the mixtures were allowed to stand for half an hour before preparations were

made. These modifications were made with a view to rendering possible the application of the method in the field.

In no case did subsequent centrifugation of the mixtures cause a change to be made in the diagnosis, although it led to concentration of the ova.

ANDERSON (C. W.). **Note sur les gîtes á Bullinus et à Planorbis de la Tunisie. Leurs rapports avec les Foyers de Bilharziose. Carte provisoire de leur répartition.** [The Localizations of Bullinus and Planorbis in Tunis. Their Relationship to Centres of Bilharziosis. Provisional Map of their Distribution.]—*Bull. Soc. Path. Exot.* 1922. Dec. 13. Vol. 15. No. 10. pp. 954–956. With 1 map.

DAUBNEY (R.). **Note on Helminths common to Man and Domesticated Animals.**—*Vet. Jl.* 1923. Mar. Vol. 79. No. 3. pp. 85–99.

FRANÇA (C.). **L'hôte intermédiaire du** *Schistosomum haematobium* **au Portugal (***Planorbis dufourii* **Graells).** [The Intermediate Host of *Schistosomum haematobium* in Portugal (*Planorbis dufourii* Graells).]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 805–809.

GRIFFITHS (J. A.). **Nematodes as a Cause of Ophthalmia.**—*Vet. Jl.* 1922. Dec. Vol. 78. No. 12. pp. 471–477.

LARROUSE (F.). **Presence de** *Phlebotomus perniciosus* **Newst., dans le départment de l'Oise.** [The Occurrence of *Phlebotomus perniciosus* in the Department of the Oise.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 16–17.

SCRJABIN (K. I.). **Parasitic Trematodes and Nematodes collected by the Expedition of Prof. V. Dogiel and I. Sokolov in British East Africa. Scientific Results of the Zool. Exp. to Brit. East Africa & Uganda.** 1914. Vol. 1. No. 4. pp. 99–157. With 10 plates. [In Russian pp. 3–98.]

SOUTHWELL (T.). **Cestodes from Indian Birds with a Note on** *Ligula intestinalis*.—*Ann. Trop. Med. & Parasit.* 1922. Dec. Vol. 16. No. 4. pp. 355–382. With 14 text figs.

BACTERIAL DISEASES.

DOYLE (T. M.). **Etiology of Equine Contagious Abortion in India.**—*Mem. Dept. Agric. in India.* Vet. Series. 1922. Oct. Vol. 3. No. 5. pp. 139–158.

In the author's experience contagious abortion in equines has not been complicated by retention of the placenta and metritis, as has been recorded by other investigators. The abortion appears to take place without difficulty, and without causing any evidence of ill-health in the mare.

Apart from the loss due to the abortion of immature foetuses, further loss is caused by the development of joint ill and death within a few days in full-time foals born of infected mares.

The author devotes some space to the literature regarding this disease.

His own investigations were directed to providing solutions to three questions :—

(1) The etiology of the disease.
(2) The identity of the causal organism with that responsible for equine abortion in Europe and America.
(3) Whether the same organism is responsible in pony and donkey mares.

The author finds that the organism is identical in all its characters with that described in England and America, and that it is responsible for abortion in both pony and donkey mares.

The morphological, staining, and cultural characters are described. Organisms from both sources cause the production of acid and gas with mannite, lactose (very small amount of acid and gas), glucose, galactose, levulose, and dextrose.

With glycerin there is a slight production of acid. Inulin gives neither acid nor gas.

It is noted that the organism grows in milk. The medium is not coagulated, and the "end of the reaction is alkaline."

A suspension of the organism in salt solution was killed in eight minutes at 60°, but it survived 45 minutes at 55° C.

Continued subcultivation causes a marked loss of virulence.

In naturally infected animals and animals inoculated intravenously the agglutination test has given most reliable results; but in animals infected by way of the alimentary canal or vagina, the results have not been so constant.

"In those cases in which the test gave a negative result, the inoculation of culture tubes showed the infection to be localized."

A dilution of 1 in 400 is considered as the lowest dilution which can be considered positive. The highest dilution in which agglutination was obtained with normal serum was 1 in 200. Subcutaneous and intraperitoneal inoculation failed to infect guinea-pigs and rabbits so as to produce visible lesions; 0·1 cc. of culture injected intravenously was fatal for rabbits in some cases. In the case of the rabbits and guinea-pigs inoculated subcutaneously and intraperitoneally no agglutination tests appear to have been carried out.

The period of incubation in pony mares following experimental infection is about 10 days, and in donkey mares 19 days.

Inoculation of foals with cultures failed to produce joint ill.

In two pony mares and in one donkey stallion arthritis developed as a result of intravenous inoculation.

ZELLER (H.). **Weitere Untersuchungen über das seuchenhafte Verwerfen des Rindes.** [Further Investigations regarding Contagious Abortion of Bovines.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1922. Dec. 30. Vol. 49. No. 1–3. pp. 65–116.

This long paper is in the nature of a summary of existing knowledge regarding the disease. It is divided into the following sections: (1) Distribution; (2) Etiology; (3) Cultivation and resistance of the bacillus; (4) Diagnosis; (5) The occurrence and demonstration of abortion bacilli and antibodies in milk; (6) Natural methods of infection; (7) Protective inoculation and treatment; (8) The relationships between Bang's bacillus and the causal organism of Malta fever; (9) The question as to whether Bang's bacillus is pathogenic for man. An extensive bibliography is included.

SUZUKI (T.) & IKI (Y.). **On the Causative Agent of Büffelseuche in Formosa and a Comparative Study of this and** *Bacillus bovisepticus*. —*Jl. Med. Assoc. Formosa.* 1922. Sept. No. 224. pp. 3–5. [English Summary.]

The authors conclude, as a result of their investigations, that *B. bubalisepticus* (ORESTE & ARMANNI) is quite distinct from *B. bovisepticus*.

SCHALK (A. F.) & RODERICK (L. M.). **Pathogenicity of** *Bacterium suisepticus* **for Hogs.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Dec. Vol. 62. No. 3. pp. 343–348.

A number of experiments were carried out in which strains of *B. suisepticus* were fed to pigs which were kept under grossly insanitary surroundings and on starvation rations with a view to determining their pathogenicity. All the strains used proved fatal to rabbits within 8 to 36 hours after inoculation.

Complete failure resulted in every case.

The authors believe that the part played by the organism in the production of swine pneumonia is quite a minor one.

NAINSOUTA. **Sur un cas de tuberculose observé chez un Zébu aux abattoirs de la ville de Dakar.** [A Case of Tuberculosis in a Zebu at the Slaughterhouse at Dakar.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 868–870.

The author detected a caseo-calcareous lesion as large as a hazel nut in one of the bronchial glands of a zebu slaughtered at Dakar. The nature of the lesion was established by microscopic examination at the Biological Institute. No other lesions were found in any of the glands or organs.

It has been stated by CURASSON and TEPPAZ that the tubercle bacilli discovered by them in cattle were of the human type.

The author draws attention to the manner in which young animals which have lost their mothers are fed, if other animals refuse to suckle them. Milk is drawn into a bowl, and the owner fills his mouth repeatedly and ejects the milk into the mouth of the calf.

DISEASES DUE TO FILTERABLE VIRUSES.

POOL (W. A.) & DOYLE (T. M.). **Studies in Rinderpest.**—*Memoirs Dept. Agric. in India.* Vet. Series. 1922. Sept. Vol. 3. No. 4. pp. 103–137.

In the first portion of this paper a survey of the results obtained by the " serum alone " method is given. The results are expressed in the form of a graph. From this it may be gathered that during the last decade the number of outbreaks per annum in which serum has been used has risen to rather more than 6,000, the number of animals inoculated to some 800,000, and the number of animals dying of rinderpest has oscillated above and below 100,000.

The second point dealt with is the duration of the immunity conferred by this method.

Inaccurate knowledge of the period of immunity conferred by serum, combined with insufficient dosage for the animals dealt with, has led to a great deal of disappointment in the field.

In order to form an accurate opinion regarding the period of immunity conferred by serum certain factors must be known. The potency of the serum must be determined as accurately as possible, and the *minimum* safe dose fixed. The methods of injecting the virus and serum must be uniform. The virus used must be reliable. The test animals must be highly susceptible, and they must be protected from other rinderpest

infection while under test. Details of experiments designed to test the duration of immunity are given, and from these the conclusions drawn are :—

A single dose gave no protection after 14 days, and did not give complete protection after 10 days. A double dose did not protect completely after 18 days. A treble dose gave no protection after 32 days. A quadruple dose gave protection after 38 days.

In a second series of tests carried out with a different " brew " of serum the intervals elapsing between the dose of serum and virus were altered. These experiments showed that :—

(1) A single dose conferred complete protection for nine days ;
(2) A double dose failed to protect for 16 days ;
(3) A treble dose did not give complete protection for 24 days ; and
(4) Four doses failed to protect for 32 days.

The general conclusions are that a single dose will protect for nine days, and that increased doses prolong the immunity, but not in proportion to the doses.

Experiments are in hand to ascertain the maximum duration of immunity conferred by serum administered in any dose necessary.

The authors state that they have been able to confirm the view expressed by WARD & WOOD that antirinderpest serum is incapable of preventing the virus from invading the animal body. [These experiments are described in another part of the paper.]

In view of the determination of the period of immunity conferred by a single dose of serum, it is clear that attempts to control the disease in India by this method are doomed to failure. The large areas under the charge of single veterinary officers and the number of outbreaks reported make it quite impossible to repeat serum injections every ninth day. Apart from this, the question of cost would have to be taken into consideration.

The practice of mixing healthy with diseased after injection with serum varies in value with the degree of susceptibility of the animals. It is less valuable among those of low susceptibility than among highly susceptible animals, for the reason that the disease spreads more slowly and its spread in a herd may continue after the lapse of the serum immunity.

An opportunity occurred at Muktesar of testing the immunity acquired by mixing healthy and diseased animals after injections of serum had been given. An accidental outbreak of rinderpest occurred in an out-kraal containing highly susceptible hill cattle. Serum was immediately injected at the maximum rate (90 cc. per 600 lb. body-weight), and the animals were kept together. Two months later they were brought into the sheds to serve as virus producers and only 5 per cent. reacted. [The actual numbers involved are not stated.]

The second portion of the paper deals with the "serum-simultaneous" method of inoculation.

This method is the best for a country like India, where the disease is enzootic. When it is used for stamping out an outbreak the objection that the use of the virus may lead to further cases of infection falls to the ground, because the virus is already in existence. That objection does, however, stand to some extent when the method is applied in the absence of any outbreak.

Apart from the intrinsic value of the method, it would be easier to carry out and would reduce the amount of work (which is often fruitless) of the veterinary staff, and would thus enable them to cover their own ground more efficiently.

One of the chief difficulties would be the provision of suitable virus, but this the authors think could be got over.

Piroplasmosis is one of the chief factors in connexion with the risks attaching to the injection of virulent blood, and it has long been realized that the piroplasmoses of cattle in India urgently require investigation.

As SHILSTON showed, the difficulty of transmitting piroplasmosis can be largely overcome when very virulent virus (from hill bulls) is used, by storing the blood for some (eight) days before it is used. By this time the piroplasms are dead, but the virus is still active. This does not hold good in the case of weaker viruses.

In the early days of simultaneous inoculations serious set-backs were experienced through the administration of too small doses of serum. This was sufficient to label the method as dangerous. It was considered that the degree of immunity conferred depended upon the severity of the reactions obtained. HOLMES showed that with single, double, and treble doses of serum combined with virus immunity lasting up to three months (and possibly more) could be conferred.

The authors have carried this line further, and details of experiments are given from which the conclusion is drawn that there is no necessity to establish any relationship between the dose of serum and the dose of virus, provided a safe dose of the former is given.* In other words, further evidence is produced that serum will not prevent infection, although it may smother the clinical evidences of it.

VAN SACEGHEM (R.). **Rapport sur le Fonctionnement du Laboratoire de Bacteriologie vétérinaire de Kissengnie (Ruanda) en 1921.** [Report of the Veterinary Bacteriological Laboratory, Kissengnie (Ruanda) for 1921.]—*Bull. Agric. Congo Belge.* 1922. June. Vol. 13. No. 2. pp. 346–357. With 3 text figs.

The author details the method by which he hyperimmunizes animals for the production of antirinderpest serum. The subcutaneous injection of citrated or defibrinated blood was found to be unduly complicated and to produce a serum of moderate value only. Resort was therefore had to direct transfusion. The donor is placed in stocks about 4 ft. 6 in. above ground-level, and thus a good fall is obtained. The blood is passed from jugular to jugular through a rubber tube with a trochar on either end and an inspection tube of glass in the course of its length.

The method is described as simple and as giving rise to no complications. The serum, it is claimed, is superior to that obtained by the older methods.

Bleeding to the extent of three litres is practised on the tenth, fourteenth, eighteenth, and twenty-fourth days. The collecting vessels are allowed to stand for two days, and the serum is then poured off and carbolized to the extent of 0·5 to 1·0 per cent. The brews of serum are collected in vessels of 20-litres capacity. The serum is absolutely aseptic, and its injection has not been known to produce abscess formation in any instance. The author has never seen any anaphylactic symptoms during or after the process of transfusion provided the animals receiving the blood have been immunized not

* For some time prior to his death SHILSTON had been carrying out experiments on these lines. He found that animals could be given a dose of virus and, at the same time, a dose of serum sufficiently large to prevent the development of any evidence of infection, and that such animals were immune when tested (with suitable controls) with virus up to 140 days later.—[ED.]

less than six months previously. Serious and sometimes fatal symptoms have been observed when immunized, recovered, or hyperimmunized animals have been subjected to transfusion within a few weeks of recovery or immunization.

Van Saceghem finds that the simultaneous injection of virus and serum for active immunization is unsatisfactory, his view being that the serum neutralizes a part of the virus at once. He has devised a more satisfactory method in which 0·1 cc. of virus is injected, and after the disease has developed a dose of 50 cc. of serum is injected intravenously on the tenth day. It is his experience that the period of incubation depends upon the dose of virus given.

KELSER (R. A.). **Equine Infectious Anaemia.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Dec. Vol. 62. No. 3. pp. 319–327. With 8 text figs.

In this article the author describes an outbreak of infectious anaemia which occurred in the Remount Depot at Fort Robinson in November, 1921.

Although the colts were closely associated with the mares only one case occurred among the former, while 27 mares out of a total of about 100 were affected. Fifteen cases terminated fatally.

The symptoms presented were those ordinarily found in such cases. Persistent high temperature was recorded in the acute cases, while in the chronic cases irregular febrile attacks were recorded. Dullness, inappetence during fever, oedema of dependent parts, and "dirty pink" conjunctiva were the chief symptoms. Petechiae were observed on the mucous membranes in some cases, and slight serous discharges from the eyes and nose were seen in others.

In five chronic cases blood counts were made, and the figures ranged from $3\frac{1}{4}$ to $4\frac{1}{4}$ million. A scarcity of eosinophiles was an outstanding feature of the blood examination.

From the small number of examinations made it appears that albuminuria is possibly more constant in acute than in chronic cases.

At the post mortem examinations the following lesions were found: Marked emaciation, yellowish or blood-tinged fluid in the peritoneal cavity. Haemorrhages of various sizes on the serous membranes. The liver was always friable and sometimes pale in colour. The spleen was up to three times the normal size, and in some cases ruptured. The kidneys showed parenchymatous degeneration.

The yellow marrow of the medulla of the long bones showed dark red areas.

The mares were pastured at times on low boggy land, which was sometimes partly submerged. There was a history that the disease had been prevalent on neighbouring farms, and as some of the mares were purchased locally it appeared to be probable that the disease was imported into the Remount Depot by some of these.

No definite information was obtained regarding the natural method of transmission, but it is stated that the general conditions appeared to suggest that pasture infection was concerned rather than biting flies.

SCOTT (J. W.). **Swamp Fever in Wyoming. Economic Importance, General Characteristics and Control.**—*University of Wyoming, Agricultural Experiment Station. Bulletin No. 121.* 1919. June. pp. 91–140. With 6 text figs.

The object of this paper is to bring to the notice of owners a general idea of the condition known as swamp fever.

The difficulties attending the control of the disease are pointed out in that (1) the cause has not been detected, (2) there appears to be no immunity, (3) no successful method of treatment has been discovered, and (4) until recently little was known regarding the manner in which the disease is transmitted.

The general impression is that the disease, which appears to have been recognized about 25 years ago, is waning, but the continued existence of chronic cases, and apparently healthy virus carriers will render possible epidemics of the disease.

The disease has a seasonal distribution. It begins in June or July, waxes until October, and then wanes through November and December. Chronic cases improve through the winter, but have relapses with the return of warm weather. Successive attacks may cause progressive weakness and finally death. On the other hand, the attacks may become less and less severe until there is no recognizable ill-health. In such cases inoculation tests will show that the animal is a virus carrier. Defective nutrition and work are both factors which influence the severity of relapses.

The disease has been diagnosed at all levels between sea-level and 9,000 ft. It has also been observed that while it may appear year after year on a certain farm, an adjoining one may be quite free from it.

In general—as its American name indicates—the disease is seen mainly on low-lying marshy land, but there appears to be no doubt that it occurs on high, well-drained land as well. Rainfall appears to influence the occurrence of the disease. It is more severe during wet seasons than during dry ones. It appears to be agreed that the disease is not contagious in the ordinary sense of the term. Healthy and infected horses may be fed and watered out of common vessels without the disease being transmitted.

All ages and breeds appear to be equally susceptible to infection, but under natural conditions the disease appears to be selective. There is no evidence to show that the virus is air-borne, the disease spreads slowly, and an epidemic is almost invariably restricted to a certain limited area.

The disease has been transmitted under experimental conditions by ingestion, the food being mixed with infective blood or urine, but where success has been achieved large quantities of infective material have been found to be essential, and the disease produced has always been of a mild type. It therefore appears to be improbable that ingestion is the usual method of infection. Other points against the ingestion theory of infection are that horses avoid food contaminated with urine, the disease is more prevalent in wet seasons (when contaminations with urine would be reduced), sunlight destroys the virus in two hours.

No success has been obtained in experimental inoculations with extracts of faeces, saliva, and sweat.

The available evidence appears to incriminate some biting parasite as the transmitting agent of the disease.

Taking into consideration geographical distribution, habits of feeding, period of prevalence, etc., the facts appear to point to flies as the transmitting agents of the disease.

The virus is filterable and is present in the blood. It is destroyed at 58° C. in one hour, two hours' exposure to sunlight kills it, but it resists drying for long periods. Virulent blood has remained infective after 30 days' exposure to temperatures below the freezing point.

The symptoms are very inconstant, and it is practically impossible to give what may be called a description of a typical case. The course

of the disease is also very variable. The most frequently observed symptoms are irregularly intermittent fever and a varying degree of anaemia, which is associated with oedema of dependent parts.

In some cases the symptoms are so vague that experimental inoculation must be resorted to in order to establish a diagnosis.

In view of the difficulty of diagnosing the disease in some cases, and of the possible existence of "carriers," once the disease has been definitely detected, all contacts should have their temperatures taken regularly with a view to detecting chronic and obscure cases, in which elevations of temperature lasting for brief periods only are the sole discoverable evidence of infection. Such animals should be isolated for observation.

No specific curative agent has been discovered as yet, nor has it been found possible to prepare a prophylactic serum. The control of the disease should therefore rest upon isolation or destruction of all affected animals. If isolation is practised it must be effective in that there should be a sufficient distance between the healthy and diseased horses to obviate the possibility of biting flies passing from one group to the other, or darkened and screened stables should be used for the diseased animals. The isolation should be permanent, or failing that, it should be repeated annually during the infective season.

SCOTT (J. M.). **Insect Transmission of Swamp Fever or Infectious Anaemia of Horses.**—*University of Wyoming Agricultural Experiment Station. Bulletin No. 133.* 1922. June. pp. 57–137. With 6 plates.

As indicated by the title this paper deals with the transmission of swamp fever. The author discusses the various theories that have been put forward by other investigators, and deals at some length with his own experiments in insect transmission.

The bulletin elaborates a good deal of the information contained in that abstracted above, and the author concludes that the most important means of natural transmission is through the agency of flies, and particularly Tabanus and *Stomoxys calcitrans*.

An extensive bibliography is given.

HAMERTON (A. E.). **Rabies in Irak and its Treatment by Carbolised Vaccine.**—*Jl. Royal Army Med. Corps.* 1922. Dec. Vol. 39. No. 6. pp. 403–418.

In the course of the article the author emphasizes the point that while the detection of Negri bodies permits of a positive diagnosis, the apparent absence of them does not warrant a negative diagnosis. Two instances, one of rabies in the dog, and one in the horse, are given in support of this statement. In neither case were Negri bodies found, but in both cases inoculation tests yielded positive results.

As in the East the medical officer is often called upon to give an opinion as to whether a dog is affected with rabies or not, and as the clinical features of the disease in this species are best described in veterinary textbooks, the author quotes for his guidance the account given by HUTYRA and MAREK.

In connection with the laboratory diagnosis of the disease detailed instruction is given regarding the methods of removing the brain and preparing specimens for microscopic examination.

The author then describes in detail the technique of the preparation of antirabic vaccine, as carried out at Baghdad, where owing to isolation and other factors certain special methods were adopted. These do not lend themselves to abstraction, and should be read in the original by those interested.

Further, indications are given of the points requiring consideration when it is necessary to form an opinion as to whether a person has been subjected to a risk of rabies or not. An outline is given of the limitations of antirabic treatment, and of the methods of treatment. In connection with the latter it is noted that thorough cauterization of the wound, even within half an hour of the bite, is not certainly effective in preventing infection. After the lapse of three or four hours it is probably useless. Valuable hints on rabbit breeding in hot countries are given in an appendix.

REMLINGER (P.), LEGER (M.) & TEPPAZ. **Contribution a l'étude de la Rage au Sénégal.** [Rabies in Senegal.]—*Bull. Soc. Path. Exot.* 1923. Jan. Vol. 16. No. 1. pp. 4–6.

It has previously been reported that the virus of rabies in Senegal, as in the Soudan, is not invariably fatal to rabbits inoculated subdurally. The proportion of resistant animals found in the two countries is 1 in 9 and 1 in 6 respectively. Further, while the fixed virus of the Pasteur Institute of Paris is invariably fatal to rabbits in 10–11 days, the same virus is very irregular in its effect when tested in Senegal, in that the interval between subdural inoculation and death may range from 17–55 days.

In Morocco the virus behaves exactly as in France. In view of the fact that the Institute of Biology at Dakar is within comparatively easy communication with the Pasteur Institute at Tangier, some comparative tests with the two viruses were carried out.

Inoculations were carried out at Dakar with fixed virus, and with street virus from Tangier, and at Tangier street virus from Senegal was used for experiments.

The results indicated that street virus from Dakar and Tangier are practically identical in their effects. Further, fixed virus from the Pasteur Institute behaves at Dakar as at Tangier. Street virus from Morocco is identical in its effects in Senegal as in Morocco.

There is one lacuna in our knowledge which it has not been found possible to fill.

Some medical men hold that in addition to recently imported European virus there exists a virus indigenous to Central Africa which is not transmissible from the dog to man by bites. Attempts have been made to obtain this type of virus—if it exists—but without success.

MANOUELIAN (Y.) & VIALA (J.). **Un Cas de rage chez une Lionne.** [A Case of Rabies in a Lioness.]—*Ann. Inst. Pasteur.* 1922. Dec. Vol. 36. No. 12. pp. 830–832. With 1 plate.

The case occurred in one out of four lionesses about eight months old imported from Abyssinia. The owner noticed on their arrival in Paris that one of the animals was unusual in its behaviour. It appeared depressed, and remained apart from the others. There was complete loss of appetite. The following day it was extremely restless and roared continuously, and it was noted that the tone of the voice was deeper.

Twenty-four hours later paralysis of the hindquarters appeared. This extended rapidly, and by the next day had involved the forelegs. Death took place on the third day.

Negri bodies were found in the hippocampus, and the lesions described by NELIS and VAN GEHUCHTEN were present in the plexiform ganglion. Perivascular infiltrations with mononuclear cells were detected in sections from the nervous system.

The virus produced typical rabies in rabbits and guinea-pigs 14 and 15 days after intraocular inoculation.

There was no indication as to how the lioness became infected.

PHISALIX (M.). **Hérisson et virus rabique.** [The Hedgehog and the Virus of Rabies.]—*Bull. Soc. Path. Exot.* 1922. Nov. 8. Vol. 15. No. 9. pp. 779–784.

Experimental inoculations of hedgehogs with fixed virus have been carried out with a view to ascertaining whether there is any relationship between resistance to venoms and to the virus of rabies. The hedgehog was selected because of the remarkable immunity which it possesses against various venoms and bacterial toxins. Four animals were inoculated, and the course of the infection varied from animal to animal.

The first developed symptoms on the sixteenth day. There was paralysis of the hindquarters, marked tetaniform spasms, wasting, and death on the tenth day after inoculation.

In the second case symptoms made their appearance on the seventeenth day. Paralysis involving at first the hindquarters gradually spread forwards. There were spasms involving the pharynx lasting for several seconds. Towards the end of the first month after inoculation there was a complete remission of symptoms. A relapse occurred and death took place on the forty-eighth day after inoculation.

The disease in the third hedgehog was characterized by symptoms of localized paralysis affecting principally the genital system. There were no tetaniform spasms. There was a short remission of symptoms a month after inoculation, but a relapse occurred, and death took place 142 days after inoculation. The animal at the time of death weighed a little more than half its original weight.

The last animal showed slight fleeting symptoms of paralysis of the hind legs from the eighty-fourth day. These lasted for a very short time only, and the animal subsequently gained in weight and finally made a complete recovery.

None of the animals showed any tendency to attack other animals or persons handling them.

Attempts to infect rabbits with material from the brains of these hedgehogs have failed.

JANUSCHKE (E.). **Bacteriologische Befunde bei Eiterungen nach der Maul-und Klauenseucheimpfung mit sterilem Rekonvaleszentenblut.** [Bacteriological Findings in Abscesses following the Injection of Sterile Blood from Animals Recovered from Foot and Mouth Disease.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1922. Nov. 4. Vol. 48. No. 5–6. pp. 304–312.

Four out of 18 animals which were injected subcutaneously with sterile blood from recovered animals developed thick-walled abscesses at the seats of injection. The blood used had been stored for some

months, and it was tested bacteriologically and found to be sterile. The principal organism found in the pus was *Bacillus pyogenes*, but there were also present staphylococci, a slender filamentous organism, and two types of Gram-negative bacilli.

The suggestion is made that the *B. pyogenes* gained access to the animals' bodies through foot-and-mouth lesions in the mouth, and established itself in the injected blood.

Frosch (P.). **Die Morphologie des Lungenseucheerregers.** [The Morphology of the Causal Organism of Pleuropneumonia.]—*Arch. f. Wissensch. u. Prakt. Tierheilk.* 1922. Dec. 30. Vol. 49. No. 1–3. pp. 35–43. With 10 text figs.

Verge (J.). **Le Pronostic de la Rage chez l'homme et chez les animaux.** [The Prognosis of Rabies in Man and Animals.]—*Rev. Path. Comp. et d'Hyg. Gén.* 1923. Mar. 5. Vol. 23. No. 224.

MISCELLANEOUS.

Black (O. F.), Eggleston (W. W.), Kelly (J. W.) & Turner (H. C.). **Poisonous Properties of** *Bikukulla cucullaria* **(Dutchman's Breeches) and** *B. canadensis* **(Squirrel Corn).**—*Jl. Agric. Res.* 1923. Jan. 13. Vol. 23. No. 2. pp. 69–78.

The authors' summary is as follows :—

"1. *Bikukulla cucullaria* and *B. canadensis*, in Virginia popularly called "little staggerweeds," have long been considered poisonous to cattle.

"2. Chemical examination has shown that both these plants contain toxic alkaloids, and that the tops as well as the bulbs of *B. cucullaria* are poisonous.

"3. *B. cucullaria* contains at least one alkaloid of a highly poisonous nature. The alkaloid, heretofore apparently unknown, has been named cucullarine, and its properties are described.

"4. Cucullarine probably occurs in *B. canadensis* also, since its physiological effect on mice closely resembles that of *B. cucullaria*.

"5. Feeding experiments show that *B. cucullaria* is toxic for cattle."

Dodd (S.). **Poisoning of Sheep by** *Solanum cinereum.*—*Vet. Jl.* 1923. Feb. Vol. 79. No. 2. pp. 56–59.

The enquiry referred to in this paper was instituted as a result of the death of 45 sheep out of a lot of 1,100 in a particular paddock. In the paddock there was plenty of grass and a fair amount of the plant. It was not known what interval had elapsed between the eating of the berries and leaves and the commencement of the mortality, but sheep had been observed to eat them two or three weeks before any were found dead. A consignment of about 10 lb. of the dried mature plant was obtained for experiment. It was found that the dried up intact fruits were apparently harmless, but that when a mash of them was made with water toxic effects were obtained. The difference is explained on the grounds that the fruits eaten dry would be mixed up with the

contents of the rumen, but when the mash was given the alkaloids would be dissolved out and would pass direct to the abomasum.

Chemical investigations are not complete, but on clinical grounds the plant would appear to belong to the solanine group and not to the atropine or nicotine groups of the Solanaceae. If the fruits are eaten fresh and in quantities of at least 8 ounces the alkaloid passes to the abomasum and death occurs in a few hours. The principal symptoms are salivation, perspiration, intense congestion of the visible mucous membranes, disordered cardiac and respiratory actions, and diarrhoea.

Of the dried fruits large quantities must be consumed in order to produce symptoms.

In a footnote to this article it is stated that the paper was read before the Royal Society of New South Wales, September 6, 1922.

McMARTIN. **Kudzu. A Remarkable Fodder Plant—A Queensland Farmer's Observations.**—*Queensland Agric. Jl.* 1922. Nov. Vol. 18. No. 5. pp. 365–366.

Kudzu is an exceptionally rapid grower. In damp warm weather the runners of the vine have been observed to advance 8 to 9 in. in 24 hours. It resists dry weather for long periods. As it is deep-rooted, it outlasts the average grasses and shrubs during dry periods.

A few experiments in feeding have been carried out. During a very dry winter the kudzu area was fed down several times by sheep, and each time, in spite of the absence of rain, fresh shoots developed immediately the sheep were removed. The author's vines have given no evidence of seeding, propagation is by roots which strike from the nodes of the main runners. He does not see any reason to discredit the American claim that kudzu when grown on trellises 12 ft. apart will carry six milking cows to the acre.

Kudzu roots should be planted in damp soil and watered every few days for a fortnight.

TINLINE (M. J.). **Prevention of Goitre in Lambs.**—*The Dominion Experimental Farms (Canada). Seasonable Hints. Prairie Edition.* 1922. Nov. No. 24. pp. 4–5.

Goitre is causing serious losses among lambs in the Prairie Provinces, and the season of 1921 was a particularly bad one in this respect. It was attributed to feeding a ration of threshed oats and oat straw. With a view to determining whether this was the case or not, a flock of 89 ewes was divided into four batches in the autumn of 1921. One lot was fed on the same ration as during the previous winter as a control; the second batch had the same diet, but it was fed at a distance from the shed to enforce exercise; the third had the same ration, but in addition a 2 per cent. solution of potassium iodide; and the fourth had a variety of feeds including hay, straw, silage, oats, bran, and oil cake. It is stated that half a pound of potassium iodide is sufficient for 22 ewes for a period of five months.

The results obtained in the "Iodide" group were the best. The lamb yield was 154 per cent., the average weight was 8·2 lb., and none showed goitre. The lamb yields in the other batches were the same or lower, the average weight ranged from 6·8–7·7 lb. and the incidence of goitre from 38 to 45 per cent.

The experiment is to be repeated.

WHEELER (G. A.), GOLDBERGER (J.) & BLACKSTOCK (M. R.). **On the Probable Identity of the Chittenden-Underhill Pellagralike Syndrome in Dogs, and "Black Tongue." With Report of Necropsy Findings in Two Cases of Blacktongue.**—*Public Health Reports.* 1922. May 5. Vol. 37. No. 18. pp. 1063–1069.

This paper does not contain any account of experimental work, but is a brief summary of the available literature (excluding Italian) on the disease generally known in this country as Stuttgart disease.

It is admitted that much work will have to be done before any definite connection between Stuttgart disease and pellagra is established, but in the opinion of the authors the resemblance between the naturally contracted disease of the dog and the condition produced experimentally in the same species by CHITTENDEN and UNDERHILL almost establishes their identity. The paper includes a full bibliography (excluding references in Italian literature which were not available).

BOSSE (R.). **Ekzem im Anschlusse an eine Neosalvarsaninfusion.** [Eczema as a Sequel to an Intravenous Injection of Neosalvarsan.] —*Berlin Tierärzt. Wochensch.* 1917. Aug. 9. Vol. 33. No. 33. p. 357.

The case was one of laminitis in a heavy artillery horse, and as the usual remedial measures effected very little improvement in the course of a fortnight an injection of 4·5 gm. of neosalvarsan in 100 cc. of boiled water was given intravenously. Within 24 hours eczema developed over an area of considerable extent between the site of injection into the left jugular vein and the shoulder. The skin was covered with a clear yellow exudate in the form of drops, and hair was beginning to fall out. The following morning there was a similar eczematous patch on the left flank. There was no evidence of irritation, and the general condition of the animal remained normal. The possibility of the case being one of mange was further negatived by the fact that the horse standing next to it failed to develop any lesions. The case is believed to be one of special susceptibility to the drug.

BODLAENDER (G.). **Über die Brauchbarkeit der Blutnährböden nach H. Langer für bakteriologische Zwecke.** [The Suitability of Langer's Blood Medium for Bacteriological Purposes.]—*Arch. f. Wissensch. u. Praktisch. Tierheilk.* 1922. Nov. 4. Vol. 48. No. 5–6. pp. 271–280.

The medium was devised as a substitute for meat or meat extract media when the latter were practically unobtainable.

Blot clot is broken up into small pieces ("it is best thoroughly kneaded by hand") and mixed with one and a half volumes of a solution containing 2 grammes of "Pankreon" (Rhenania), 1 gm. of sodium carbonate, and 5 cc. of chloroform in a litre of water. The mixture is incubated at 37° C. for 48 hours, and is then steamed and filtered. This gives a clear brown liquid, which after being rendered faintly alkaline may be used as broth or for the production of agar.

Bodlaender found that slight modifications might be introduced into the method of manufacture.

Sometimes after steaming a slight turbidity makes its appearance. This can be got rid of by acidulating with acetic acid, steaming, filtering, and again correcting the reaction.

Tubercle bacilli were found to grow on it when 2 per cent. glycerin was added. Growth was very sparing in primary cultures, and evidence of growth was only obtained after about three weeks. [It is not stated whether the cultures were themselves subcultures or primary growths from lesions.] A list is given showing the bacteria used in the tests of the medium and the results obtained. The indications are that the medium is not inferior to those prepared from meat or meat extracts.

MacArthur (W. P.). **The Elementary Principles of Zoological Nomenclature.**— *Jl. Royal Army Med. Corps.* 1922. Dec. Vol. 39. No. 6. pp. 441–449.

In this paper the author has, at the request of a number of officers, given a general outline of the system upon which zoological nomenclature is based, and it will no doubt be found very useful by those who are not familiar with the subject.

Alleaux (V.). **L'Elevage et les Maladies des animaux domestiques à Madagascar.** [The Breeding and Diseases of Domesticated Animals in Madagascar.]— *Rev. Gén. Méd. Vét.* 1922. Dec. 15. Vol. 31. No. 372. pp. 697–710. With 2 text figs.

Goldberg (S. A.) & Maynard (L. A.). **Studies of Cotton Seed Poisoning. I. The Pathological Tissue Changes resulting from Continuous Feeding of Cotton Seed Meal.**— *Jl. Amer. Vet. Med. Assoc.* 1923. Jan. Vol. 52. No. 4. pp. 450–457. With 6 text figs.

Robinson (E. M.). **Non-Specific Gall-Sickness of Cattle in South Africa.**— *Union of South Africa. Jl. Dept. Agric.* 1923. Feb. Vol. 6. No. 2. pp. 137–143.

REPORTS.

UNION OF SOUTH AFRICA. **Annual Report of the Department of Agriculture for the Year ended June 30th, 1922.**—Ex. *Journal of Dept. of Agric.* 1922. Dec. Vol. 5. No. 6.

Report No. II. Veterinary Division.—The principal veterinary officer emphasizes the necessity of appointing a sufficiently large field staff to ensure the proper observation of regulations. He points out that economy can be pushed too far, and that actual saving would promptly result from the employment of additional officers.

East Coast Fever.—In the Cape Province one outbreak was detected during the year and only one animal is known to have died. Within the quarantined area the dipping interval was shortened from 7 to 5 days.

In the Transvaal nine districts are infected against six at the end of the previous year.

In Natal the general position has improved, but outbreaks have occurred in previously clean areas. Inadequate supervision and familiarity with the disease led to slackening and even cessation of dipping in certain parts.

In the Transkei the position as shown by the number of outbreaks and the areas in quarantine is slightly worse than last year. Anthrax is very prevalent, and is responsible for greater losses than those due to all other contagious diseases. The practice of skinning and cutting up carcases of animals dying suddenly is largely responsible for the prevalence of the disease.

Dourine or Slapsiekte.—In the Cape 47 outbreaks, involving 1,155 animals, were dealt with, 102 of these died or were destroyed. In the Orange Free State the disease was discovered in the Boshof District and 39 animals were destroyed.

Report No. III. Veterinary Education and Research.—It is not possible to make satisfactory abstracts of the condensed accounts of research work published in a report of this kind, but the subjects referred to will no doubt receive full treatment elsewhere. Mention may, however, be made of the detection of Malta Fever in some goats.